WHAT IS CLAIMED IS:

1. An image decoding device for decoding a hierarchically encoded compressed code obtained by dividing an image into a plurality of tiles and performing discrete wavelet transform on pixel values of the image tile by tile, the image decoding device comprising:

a tile boundary smoothing part that performs smoothing of tile boundary distortion on the image after the decoding by application of a low-pass filter, the tile boundary smoothing part controlling a degree of smoothing of the low-pass filter according to a ratio of decoding quantity to the entire quantity of the compressed code, the decoding quantity being a portion of the compressed code which portion is to be decoded.

2. The image decoding device as claimed in

claim 1, wherein said tile boundary smoothing part increases the degree of smoothing of the low-pass filter as the ratio of the decoding quantity to the entire quantity of the compressed code decreases.

3. The image decoding device as claimed in claim 2, wherein a weighting factor *m* of a center of the low-pass filter is calculated based on m = 32**R*, where *R* is the ratio of the decoding quantity to the entire quantity of the compressed code.

4. The image decoding device as claimed in claim 1, wherein said tile boundary smoothing part is prevented from performing the smoothing of tile boundary distortion when the ratio of the decoding quantity to the entire quantity of the compressed code exceeds a predetermined threshold.

5. The image decoding device as claimed in claim 1, further comprising a tile boundary specifying part that specifies a tile boundary so that said tile boundary smoothing part performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

6. The image decoding device as claimed in claim 5, wherein the tile boundary specified by said tile boundary specifying part exists within a region of interest (ROI).

7. The image decoding device as claimed in claim 1, wherein said tile boundary smoothing part performs the smoothing of tile boundary distortion on the image after the decoding by applying the low-pass filter to peripheral pixels of a tile boundary in the image.

8. The image decoding device as claimed in claim 1, wherein:

the image is a moving image comprising a plurality of frames successively decodable by the image decoding device; and

said tile boundary smoothing part performs the smoothing of tile boundary distortion on each of the frames after the decoding,

the image decoding device further comprising:

a mode selection part that makes selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

a tile boundary smoothing switching part that switches a processing mode between the first mode and the second mode based on the selection by said mode selection part in the smoothing of tile boundary distortion on the frames after the decoding by said tile boundary smoothing part.

9. The image decoding device as claimed in claim 8, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on a type of the frame; and

said tile boundary smoothing switching part switches the processing mode to the first mode for a start frame and a final frame of the moving image, and to the second mode for the other frames of the moving image.

10. The image decoding device as claimed in claim 9, wherein said tile boundary smoothing switching part further switches the processing mode to the second mode for a suspended frame of the moving image at suspension of reproduction thereof.

11. The image decoding device as claimed in claim 8, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on code quantity of the frame by which code quantity the frame is to be decoded; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the code quantity of the frame is less than or equal to a predetermined threshold, and to the second mode if the code quantity of the frame is to be decoded exceeds the predetermined threshold.

12. The image decoding device as claimed in claim 8, wherein:

said mode selection part makes one of the first and second modes selectable based on a frame rate in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the frame rate is lower than or equal to a predetermined threshold, and to the second mode if the frame rate exceeds the predetermined threshold.

13. The image decoding device as claimed in claim 8, wherein said tile boundary smoothing part applies the low-pass filter to peripheral pixels of a tile boundary in each of the frames after the decoding.

14. The image decoding device as claimed in claim 13, wherein the low-pass filter applied by said tile boundary smoothing part is uniform for the peripheral pixels in the second mode, and is adaptively controlled in the degree of smoothing according to the peripheral pixels in the first mode.

15. The image decoding device as claimed in claim 14, wherein said tile boundary smoothing part adaptively controls the low-pass filter in the degree of smoothing according to a pixel-boundary distance and an edge amount of each of the peripheral pixels.

16. The image decoding device as claimed in claim 8, further comprising a tile boundary specifying part that specifies a tile boundary so that said tile boundary smoothing part performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

17. The image decoding device as claimed in claim 16, wherein the tile boundary specified by said tile boundary specifying part exists within an ROI.

18. An image processing apparatus, comprising:

a code stream storing part that stores a hierarchically encoded compressed code obtained by dividing an image into a plurality of tiles and performing discrete wavelet transform on pixel values of the image tile by tile;

a decoding quantity specifying part that specifies decoding quantity of the compressed code,

the decoding quantity being a portion of the compressed code which portion is to be decoded;

an image decoding part that decodes the compressed code by the decoding quantity specified by said decoding quantity specifying part; and

an image display part that causes a display unit to display the image based on the compressed code decoded by said image decoding part,

wherein said image decoding part comprises a tile boundary smoothing part that performs smoothing of tile boundary distortion on the image after the decoding by application of a low-pass filter, the tile boundary smoothing part controlling a degree of smoothing of the low-pass filter according to a ratio of the decoding quantity to the entire quantity of the compressed code.

19. The image processing apparatus as claimed in claim 18, wherein said tile boundary smoothing part increases the degree of smoothing of the low-pass filter as the ratio of the decoding quantity to the entire quantity of the compressed

code decreases.

20. The image processing apparatus as claimed in claim 19, wherein a weighting factor *m* of a center of the low-pass filter is calculated based on $m = 32*R$, where *R* is the ratio of the decoding quantity to the entire quantity of the compressed code.

21. The image processing apparatus as claimed in claim 18, wherein said tile boundary smoothing part is prevented from performing the smoothing of tile boundary distortion when the ratio of the decoding quantity to the entire quantity of the compressed code exceeds a predetermined threshold.

22. The image processing apparatus as claimed in claim 18, further comprising a tile boundary specifying part that specifies a tile boundary so that said tile boundary smoothing part performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

23. The image processing apparatus as claimed in claim 22, wherein the tile boundary specified by said tile boundary specifying part exists within a region of interest (ROI).

24. The image processing apparatus as claimed in claim 18, wherein said tile boundary smoothing part performs the smoothing of tile boundary distortion on the image after the decoding by applying the low-pass filter to peripheral pixels of a tile boundary in the image.

25. The image processing apparatus as claimed in claim 18, wherein:

the image is a moving image comprising a plurality of frames successively decodable by said image decoding part;

said tile boundary smoothing part performs the smoothing of tile boundary distortion on each of the frames after the decoding; and

said image decoding part further comprises:

a mode selection part that makes selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

a tile boundary smoothing switching part that switches a processing mode between the first mode and the second mode based on the selection by said mode selection part in the smoothing of tile boundary distortion on the frames after the decoding by said tile boundary smoothing part.

26. The image processing apparatus as

claimed in claim 25, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on a type of the frame; and

said tile boundary smoothing switching part switches the processing mode to the first mode for a start frame and a final frame of the moving image, and to the second mode for the other frames of the moving image.

27. The image processing apparatus as claimed in claim 26, wherein said tile boundary smoothing switching part further switches the processing mode to the second mode for a suspended frame of the moving image at suspension of reproduction thereof.

28. The image processing apparatus as claimed in claim 25, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on code quantity of the frame by which code quantity the frame is to be decoded; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the code quantity of the frame is less than or equal to a predetermined threshold, and to the second mode if the code quantity of the frame exceeds the predetermined threshold.

29. The image processing apparatus as claimed in claim 25, wherein:

said mode selection part makes one of the first and second modes selectable based on a frame rate in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the frame rate is lower than or equal to a predetermined threshold, and to the second mode if the frame rate exceeds the predetermined threshold.

30. The image processing apparatus as claimed in claim 25, wherein said tile boundary smoothing part applies the low-pass filter to peripheral pixels of a tile boundary in each of the frames after the decoding.

31. The image processing apparatus as claimed in claim 30, wherein the low-pass filter applied by said tile boundary smoothing part is uniform for the peripheral pixels in the second mode, and is adaptively controlled in the degree of smoothing according to the peripheral pixels in the first mode.

32. The image processing apparatus as claimed in claim 31, wherein said tile boundary smoothing part adaptively controls the low-pass filter in the degree of smoothing according to a pixel-boundary distance and an edge amount of each of

the peripheral pixels.

33. The image processing apparatus as claimed in claim 25, wherein said image decoding part further comprises a tile boundary specifying part that specifies a tile boundary so that said tile boundary smoothing part performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

34. The image processing apparatus as claimed in claim 33, wherein the tile boundary specified by said tile boundary specifying part exists within an ROI.

35. The image processing apparatus as

claimed in claim 18, wherein:

said tile boundary smoothing part applies the low-pass filter to peripheral pixels of a tile boundary; and

weighting factors of the low-pass filter are asymmetric with respect a direction of the tile boundary.

36. The image processing apparatus as claimed in claim 35, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

37. The image processing apparatus as claimed in claim 35, wherein the weighting factors of the low-pass filter are asymmetric in a case where taps of the low-pass filter cross the tile boundary.

38. The image processing apparatus as claimed in claim 35, wherein the weighting factors of the low-pass filter are asymmetric in a case where mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

39. The image processing apparatus as claimed in claim 35, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs among components of the image.

40. The image processing apparatus as claimed in claim 35, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

41. The image processing apparatus as claimed in claim 35, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

42. The image processing apparatus as claimed in claim 35, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

43. The image processing apparatus as claimed in claim 42, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

44. The image processing apparatus as claimed in claim 35, wherein a frequency characteristic of the low-pass filter differs among components of the image.

45. The image processing apparatus as claimed in claim 35, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

46. The image processing apparatus as claimed in claim 35, wherein a frequency characteristic of the low-pass filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

47. The image processing apparatus as claimed in claim 35, wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

48. The image processing apparatus as claimed in claim 35, wherein said tile boundary smoothing part applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

49. The image processing apparatus as claimed in claim 35, wherein said tile boundary smoothing part applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

50. The image processing apparatus as claimed in claim 18, wherein:

said tile boundary smoothing part applies the low-pass filter to peripheral pixels of a tile boundary; and

sizes of mean pixel value errors of the peripheral pixels are reflected in weighting factors of the low-pass filter.

51. The image processing apparatus as claimed in claim 50, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

52. The image processing apparatus as claimed in claim 50, wherein the sizes of the mean pixel value errors are reflected in the weighting

factors of the low-pass filter in a case where taps of the low-pass filter cross the tile boundary.

53. The image processing apparatus as claimed in claim 50, wherein the sizes of the mean pixel value errors are reflected in the weighting factors of the low-pass filter in a case where the mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

54. The image processing apparatus as claimed in claim 50, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs among components of the image.

55. The image processing apparatus as claimed in claim 50, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

56. The image processing apparatus as claimed in claim 50, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

57. The image processing apparatus as claimed in claim 50, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

58. The image processing apparatus as claimed in claim 57, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

59. The image processing apparatus as claimed in claim 50, wherein a frequency characteristic of the low-pass filter differs among components of the image.

60. The image processing apparatus as claimed in claim 50, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

61. The image processing apparatus as

claimed in claim 50, wherein a frequency characteristic of the low-pass filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

62. The image processing apparatus as claimed in claim 50, wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

63. The image processing apparatus as claimed in claim 50, wherein said tile boundary smoothing part applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

64. The image processing apparatus as claimed in claim 50, wherein said tile boundary smoothing part applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

65. A moving image display system, comprising:

an image input part acquiring a moving image composed of a plurality of frames;

an image compression part that divides each of the frames into a plurality of tiles and performs discrete wavelet transform on pixel values of each of the frames tile by tile so as to hierarchically compress and encode the moving image;

an image decoding part that successively decodes the compressed and encoded frames; and

an image display part that causes a display unit to display the image based on the decoded frames,

wherein said image decoding part comprises:

a tile boundary smoothing part that performs smoothing of tile boundary distortion in

each of the frames after the decoding;

a mode selection part that makes selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

a tile boundary smoothing switching part that switches a processing mode between the first mode and the second mode based on the selection by said mode selection part in the smoothing of tile boundary distortion on the frames after the decoding by said tile boundary smoothing part.

66. The moving image display system as claimed in claim 65, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on a type of the frame; and

said tile boundary smoothing switching part switches the processing mode to the first mode for a start frame and a final frame of the moving image, and to the second mode for the other frames of the

moving image.

67. The moving image display system as claimed in claim 66, wherein said tile boundary smoothing switching part further switches the processing mode to the second mode for a suspended frame of the moving image at suspension of reproduction thereof.

68. The moving image display system as claimed in claim 65, wherein:

said mode selection part makes one of the first and second modes selectable for each of the frames based on code quantity of the frame by which code quantity the frame is to be decoded; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the code quantity of the frame is less than or equal to a predetermined threshold, and to the second mode if

the code quantity of the frame exceeds the predetermined threshold.

69. The moving image display system as claimed in claim 65, wherein:

said mode selection part makes one of the first and second modes selectable based on a frame rate in the smoothing of tile boundary distortion by said tile boundary smoothing part; and

said tile boundary smoothing switching part switches the processing mode to the first mode if the frame rate is lower than or equal to a predetermined threshold and to the second mode if the frame rate exceeds the predetermined threshold.

70. The moving image display system as claimed in claim 65, wherein said tile boundary smoothing part applies the low-pass filter to peripheral pixels of a tile boundary in each of the

frames after the decoding.

71. The moving image display system as claimed in claim 70, wherein the low-pass filter applied by said tile boundary smoothing part is uniform for the peripheral pixels in the second mode, and is adaptively controlled in the degree of smoothing according to the peripheral pixels in the first mode.

72. The moving image display system as claimed in claim 71, wherein said tile boundary smoothing part adaptively controls the low-pass filter in the degree of smoothing according to a pixel-boundary distance and an edge amount of each of the peripheral pixels.

73. The moving image display system as claimed in claim 65, wherein said image decoding part further comprises a tile boundary specifying part that specifies a tile boundary so that said tile boundary smoothing part performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

74. The moving image display system as claimed in claim 73, wherein the tile boundary specified by said tile boundary specifying part exists within an ROI.

75. A method of decoding a hierarchically encoded compressed code obtained by dividing an image into a plurality of tiles and performing discrete wavelet transform on pixel values of the image tile by tile, the method comprising the step of:

(a) performing smoothing of tile boundary

distortion on the image after the decoding by application of a low-pass filter,

wherein said step (a) controls a degree of smoothing of the low-pass filter according to a ratio of decoding quantity to the entire quantity of the compressed code, the decoding quantity being a portion of the compressed code which portion is to be decoded.

76. The method as claimed in claim 75, wherein said step (a) increases the degree of smoothing of the low-pass filter as the ratio of the decoding quantity to the entire quantity of the compressed code decreases.

77. The method as claimed in claim 76, wherein a weighting factor m of a center of the low-pass filter is calculated based on m = 32*R, where R is the ratio of the decoding quantity to the entire

quantity of the compressed code.

78. The method as claimed in claim 75, wherein said step (a) is prevented from performing the smoothing of tile boundary distortion when the ratio of the decoding quantity to the entire quantity of the compressed code exceeds a predetermined threshold.

79. The method as claimed in claim 75, further comprising the step of (b) specifying a tile boundary so that said step (a) performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

80. The method as claimed in claim 79,

wherein the tile boundary specified by said step (b) exists within a region of interest (ROI).

81. The method as claimed in claim 75, wherein said step (a) performs the smoothing of tile boundary distortion on the image after the decoding by applying the low-pass filter to peripheral pixels of a tile boundary in the image.

82. The method as claimed in claim 75, wherein the image is a moving image comprising a plurality of frames successively decodable by the method, and said step (a) performs the smoothing of tile boundary distortion on each of the frames after the decoding,

the method further comprising the step of (b) making selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing

of tile boundary distortion by said step (a) so that a processing mode is switched between the first mode and the second mode based on the selection by said step (b) in the smoothing of tile boundary distortion on the frames after the decoding by said step (a).

83. The method as claimed in claim 82, wherein:

said step (b) makes one of the first and second modes selectable for each of the frames based on a type of the frame; and

the processing mode is switched to the first mode for a start frame and a final frame of the moving image, and to the second mode for the other frames of the moving image.

84. The method as claimed in claim 83, wherein the processing mode is also switched to the second mode for a suspended frame of the moving image

at suspension of reproduction thereof.

85. The method as claimed in claim 82, wherein:

said step (b) makes one of the first and second modes selectable for each of the frames based on code quantity of the frame by which code quantity the frame is to be decoded; and

the processing mode is switched to the first mode if the code quantity of the frame is less than or equal to a predetermined threshold, and to the second mode if the code quantity of the frame exceeds the predetermined threshold.

86. The method as claimed in claim 82, wherein:

said step (b) makes one of the first and second modes selectable based on a frame rate in the smoothing of tile boundary distortion by said step

(a); and

the processing mode is switched to the first mode if the frame rate is lower than or equal to a predetermined threshold, and to the second mode if the frame rate exceeds the predetermined threshold.

87. The method as claimed in claim 82, wherein said step (a) applies the low-pass filter to peripheral pixels of a tile boundary in each of the frames after the decoding.

88. The method as claimed in claim 87, wherein the low-pass filter applied by said step (a) is uniform for the peripheral pixels in the second mode, and is adaptively controlled in the degree of smoothing according to the peripheral pixels in the first mode.

89. The method as claimed in claim 88, wherein said step (a) adaptively controls the low-pass filter in the degree of smoothing according to a pixel-boundary distance and an edge amount of each of the peripheral pixels.

90. The method as claimed in claim 82, further comprising the step of (c) specifying a tile boundary so that said step (b) performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

91. The method as claimed in claim 90, wherein the tile boundary specified by said step (c) exists within an ROI.

92. The method as claimed in claim 75, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

weighting factors of the low-pass filter are asymmetric with respect a direction of the tile boundary.

93. The method as claimed in claim 92, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

94. The method as claimed in claim 92, wherein the weighting factors of the low-pass filter are asymmetric in a case where taps of the low-pass filter cross the tile boundary.

95. The method as claimed in claim 92, wherein the weighting factors of the low-pass filter are asymmetric in a case where mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

96. The method as claimed in claim 92, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs among components of the image.

97. The method as claimed in claim 92, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

98. The method as claimed in claim 92, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

99. The method as claimed in claim 92, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

100. The method as claimed in claim 99, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

101. The method as claimed in claim 92, wherein a frequency characteristic of the low-pass filter differs among components of the image.

102. The method as claimed in claim 92, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

103. The method as claimed in claim 92, wherein a frequency characteristic of the low-pass filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

104. The method as claimed in claim 92,

wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

105. The method as claimed in claim 92, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

106. The method as claimed in claim 92, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

107. The method as claimed in claim 75, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

sizes of mean pixel value errors of the peripheral pixels are reflected in weighting factors of the low-pass filter.

108. The method as claimed in claim 107, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

109. The method as claimed in claim 107, wherein the sizes of the mean pixel value errors are reflected in the weighting factors of the low-pass filter in a case where taps of the low-pass filter

cross the tile boundary.

110. The method as claimed in claim 107, wherein the sizes of the mean pixel value errors are reflected in the weighting factors of the low-pass filter in a case where the mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

111. The method as claimed in claim 107, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs among components of the image.

112. The method as claimed in claim 107, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

113. The method as claimed in claim 107, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

114. The method as claimed in claim 107, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

115. The method as claimed in claim 114, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

116. The method as claimed in claim 107, wherein a frequency characteristic of the low-pass filter differs among components of the image.

117. The method as claimed in claim 107, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

118. The method as claimed in claim 107, wherein a frequency characteristic of the low-pass

filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

119. The method as claimed in claim 107, wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

120. The method as claimed in claim 107, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

121. The method as claimed in claim 107,

wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

122. A computer-readable recording medium storing a program for causing a computer to execute a method of decoding a hierarchically encoded compressed code obtained by dividing an image into a plurality of tiles and performing discrete wavelet transform on pixel values of the image tile by tile, the method comprising the step of:

(a) performing smoothing of tile boundary distortion on the image after the decoding by application of a low-pass filter,

wherein said step (a) controls a degree of smoothing of the low-pass filter according to a ratio of decoding quantity to the entire quantity of the compressed code, the decoding quantity being a portion of the compressed code which portion is to be decoded.

123. The computer-readable recording medium as claimed in claim 122, wherein said step (a) increases the degree of smoothing of the low-pass filter as the ratio of the decoding quantity to the entire quantity of the compressed code decreases.

124. The computer-readable recording medium as claimed in claim 123, wherein a weighting factor *m* of a center of the low-pass filter is calculated based on $m = 32*R$, where *R* is the ratio of the decoding quantity to the entire quantity of the compressed code.

125. The computer-readable recording medium as claimed in claim 122, wherein said step (a) is prevented from performing the smoothing of tile boundary distortion when the ratio of the decoding quantity to the entire quantity of the compressed code exceeds a predetermined threshold.

126. The computer-readable recording medium as claimed in claim 122, wherein the method further comprises the step of (b) specifying a tile boundary so that said step (a) performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

127. The computer-readable recording medium as claimed in claim 126, wherein the tile boundary specified by said step (b) exists within a region of interest (ROI).

128. The computer-readable recording medium as claimed in claim 122, wherein said step (a) performs the smoothing of tile boundary distortion on the image after the decoding by applying the low-pass filter to peripheral pixels of a tile boundary in the image.

129. The computer-readable recording medium as claimed in claim 122, wherein the image is a moving image comprising a plurality of frames successively decodable by the method, and said step (a) performs the smoothing of tile boundary distortion on each of the frames after the decoding,

the method further comprising the step of (b) making selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing of tile boundary distortion by said step (a) so that a processing mode is switched between the first mode and the second mode based on the selection by said step (b) in the smoothing of tile boundary distortion on the frames after the decoding by said step (a).

130. The computer-readable recording medium as claimed in claim 129, wherein:

said step (b) makes one of the first and second modes selectable for each of the frames based on a type of the frame; and

the processing mode is switched to the first

mode for a start frame and a final frame of the moving image, and to the second mode for the other frames of the moving image.

131. The computer-readable recording medium as claimed in claim 130, wherein the processing mode is also switched to the second mode for a suspended frame of the moving image at suspension of reproduction thereof.

132. The computer-readable recording medium as claimed in claim 129, wherein:

said step (b) makes one of the first and second modes selectable for each of the frames based on code quantity of the frame by which code quantity the frame is to be decoded; and

the processing mode is switched to the first mode if the code quantity of the frame is less than or equal to a predetermined threshold, and to the

second mode if the code quantity of the frame exceeds the predetermined threshold.

133. The computer-readable recording medium as claimed in claim 129, wherein:

said step (b) makes one of the first and second modes selectable based on a frame rate in the smoothing of tile boundary distortion by said step (a); and

the processing mode is switched to the first mode if the frame rate is lower than or equal to a predetermined threshold, and to the second mode if the frame rate exceeds the predetermined threshold.

134. The computer-readable recording medium as claimed in claim 129, wherein said step (a) applies the low-pass filter to peripheral pixels of a tile boundary in each of the frames after the decoding.

135. The computer-readable recording medium as claimed in claim 134, wherein the low-pass filter applied by said step (a) is uniform for the peripheral pixels in the second mode, and is adaptively controlled in the degree of smoothing according to the peripheral pixels in the first mode.

136. The computer-readable recording medium as claimed in claim 135, wherein said step (a) adaptively controls the low-pass filter in the degree of smoothing according to a pixel-boundary distance and an edge amount of each of the peripheral pixels.

137. The computer-readable recording medium as claimed in claim 129, wherein the method further comprises the step of (c) specifying a tile boundary so that said step (b) performs the smoothing of tile boundary distortion only on a peripheral pixel of the specified tile boundary.

138. The computer-readable recording medium as claimed in claim 137, wherein the tile boundary specified by said step (c) exists within an ROI.

139. The computer-readable recording medium as claimed in claim 122, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

weighting factors of the low-pass filter are asymmetric with respect a direction of the tile boundary.

140. The computer-readable recording medium as claimed in claim 139, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

141. The computer-readable recording medium as claimed in claim 139, wherein the weighting factors of the low-pass filter are asymmetric in a case where taps of the low-pass filter cross the tile boundary.

142. The computer-readable recording medium as claimed in claim 139, wherein the weighting factors of the low-pass filter are asymmetric in a case where mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

143. The computer-readable recording medium as claimed in claim 139, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs among components of the image.

144. The computer-readable recording medium as claimed in claim 139, wherein a degree of asymmetry of the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

145. The computer-readable recording medium as claimed in claim 139, wherein a degree of asymmetry of the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

146. The computer-readable recording medium as claimed in claim 139, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

147. The computer-readable recording medium as claimed in claim 146, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

148. The computer-readable recording medium as claimed in claim 139, wherein a frequency characteristic of the low-pass filter differs among components of the image.

149. The computer-readable recording medium as claimed in claim 139, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

150. The computer-readable recording medium

as claimed in claim 139, wherein a frequency characteristic of the low-pass filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

151. The computer-readable recording medium as claimed in claim 139, wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

152. The computer-readable recording medium as claimed in claim 139, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

153. The computer-readable recording medium as claimed in claim 139, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

154. The computer-readable recording medium as claimed in claim 122, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

sizes of mean pixel value errors of the peripheral pixels are reflected in weighting factors of the low-pass filter.

155. The computer-readable recording medium as claimed in claim 154, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a pixel-boundary distance of one of

the peripheral pixels which one is a target of the low-pass filter.

156. The computer-readable recording medium as claimed in claim 154, wherein the sizes of the mean pixel value errors are reflected in the weighting factors of the low-pass filter in a case where taps of the low-pass filter cross the tile boundary.

157. The computer-readable recording medium as claimed in claim 154, wherein the sizes of the mean pixel value errors are reflected in the weighting factors of the low-pass filter in a case where the mean pixel value error generated in one of the peripheral pixels which one is a target of the low-pass filter is greater than mean pixel value errors of two pixels adjacent to the one of the peripheral pixels.

158. The computer-readable recording medium as claimed in claim 154, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs among components of the image.

159. The computer-readable recording medium as claimed in claim 154, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter differs according to a compression rate of the compressed image.

160. The computer-readable recording medium as claimed in claim 154, wherein a degree of reflection of the sizes of the mean pixel value errors in the weighting factors of the low-pass filter depends on a type of a wavelet filter employed in the compression and decompression of the image.

161. The computer-readable recording medium as claimed in claim 154, wherein a frequency characteristic of the low-pass filter depends on a pixel-boundary distance of one of the peripheral pixels which one is a target of the low-pass filter.

162. The computer-readable recording medium as claimed in claim 161, wherein the frequency characteristic of the low-pass filter further depends on an edge degree of a periphery of the tile boundary.

163. The computer-readable recording medium as claimed in claim 154, wherein a frequency characteristic of the low-pass filter differs among components of the image.

164. The computer-readable recording medium as claimed in claim 154, wherein a frequency characteristic of the low-pass filter depends on a compression rate of the compressed image.

165. The computer-readable recording medium as claimed in claim 154, wherein a frequency characteristic of the low-pass filter differs according to a type of a wavelet filter employed in the compression and decompression of the image.

166. The computer-readable recording medium as claimed in claim 154, wherein a frequency characteristic of the low-pass filter depends on an edge degree of a periphery of the tile boundary.

167. The computer-readable recording medium as claimed in claim 154, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary after inverse color conversion is performed on the decoded image.

168. The computer-readable recording medium as claimed in claim 154, wherein said step (a) applies the low-pass filter to the peripheral pixels of the tile boundary before inverse color conversion is performed on the decoded image.

169. A program for causing a computer to execute a method of decoding a hierarchically encoded compressed code obtained by dividing an image into a plurality of tiles and performing discrete wavelet transform on pixel values of the image tile by tile, the method comprising the step of:

(a) performing smoothing of tile boundary

distortion on the image after the decoding by application of a low-pass filter,

wherein said step (a) controls a degree of smoothing of the low-pass filter according to a ratio of decoding quantity to the entire quantity of the compressed code, the decoding quantity being a portion of the compressed code which portion is to be decoded.

170. The program as claimed in claim 169, wherein the image is a moving image comprising a plurality of frames successively decodable by the method, and said step (a) performs the smoothing of tile boundary distortion on each of the frames after the decoding,

the method further comprising the step of (b) making selectable one of a first mode for giving priority to image quality and a second mode for giving priority to processing speed in the smoothing of tile boundary distortion by said step (a) so that a processing mode is switched between the first mode and the second mode based on the selection by said

step (b) in the smoothing of tile boundary distortion on the frames after the decoding by said step (a).

171. The program as claimed in claim 169, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

weighting factors of the low-pass filter are asymmetric with respect a direction of the tile boundary.

172. The program as claimed in claim 169, wherein:

said step (a) applies the low-pass filter to peripheral pixels of a tile boundary; and

sizes of mean pixel value errors of the peripheral pixels are reflected in weighting factors of the low-pass filter.